

SHIGELLOSIS

Potential Bioterrorism Agent: Category B

Also known as: Bacillary dysentery, Shigella

Responsibilities:

Hospital: Report by facsimile, mail or phone

Lab: Report by facsimile, mail or phone

Physician: Report by facsimile, mail or phone

Local Public Health Agency (LPHA): Follow-up required

Iowa Department of Public Health

Disease Reporting Hotline: (800) 362-2736

Secure Fax: (515) 281-5698

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Agent

Shigellosis refers to disease caused by any bacteria in the genus *Shigella*. There are four *Shigella* species: *S. dysenteriae* (Group A), *S. flexneri* (Group B), *S. boydii* (Group C), and *S. sonnei* (Group D). Groups A, B, C, and D are further divided into 15, 8, and 19 serotypes, respectively, but *S. sonnei* consists of only one serotype. Some strains produce enterotoxin and Shiga toxin, which probably play a role in destructive ulcerations in the intestines once the organisms have invaded. This explains the watery and sometimes bloody diarrhea seen the first or second day of illness.

B. Clinical Description

Symptoms: are characterized by diarrhea accompanied by fever, nausea and sometimes, vomiting, cramps and tenesmus (painful, especially ineffectual straining at stool or urination).

Onset: typically includes blood and mucus in stools, resulting from mucosal ulcerations and minute abscesses caused by the invasive organisms. Milder cases may have a watery diarrhea. Illness is usually self-limited, lasting an average of 4 - 7 days

Complications: The most common complication is dehydration, but they may also include convulsions in young children. Other complications include intestinal perforation, hemolytic uremic syndrome and reactive postinfectious arthropathy. The severity of illness is a function of the host (age and preexisting nutritional state), the serotype, and bacteria's ability to produce toxin. Death is uncommon in U.S., but common worldwide.

C. Reservoirs

Common reservoirs: Humans are the only significant reservoir.

D. Modes of Transmission

Person-to-Person: Transmitted via the fecal-oral route. People shedding bacteria may contaminate food by failing to properly wash their hands before food handling, potentially causing large numbers of people to become ill. A very small dose of *Shigella* is needed to cause illness (probably 10 – 100 organisms); thus, it can be easily spread. Person-to-person spread typically occurs among household contacts, pre-school children in child care, and the elderly and developmentally disabled living in residential facilities. Secondary attack rate in households can be as high as 40%. Transmission can also occur person-to-person through certain types of sexual contact (*e.g.*, oral-anal contact).

Foodborne: Flies can potentially spread the bacteria by landing on contaminated feces and then on food. This is most common during international travel.

Waterborne: Fecal contaminated recreational water, such as fill and drain wading pools, can be a source for spread.

E. Incubation period

The incubation period can vary from 12 - 96 hours, but is usually about 24 - 72 hours. It can be up to a week for *S. dysenteriae*.

F. Period of Communicability or Infectious Period

The disease is communicable as long as infected people excrete *Shigella* in their stool. This usually lasts less than 4 weeks from onset of illness; however, people are most infectious while having diarrhea. Very rarely, the asymptomatic carrier state may persist for months or longer; appropriate antibiotic treatment usually reduces duration of carriage to a few days.

G. Epidemiology

Shigellosis has a worldwide distribution, with approximately 125 million illnesses and 14,000 deaths reported annually throughout the world. Two-thirds of these cases and most of the deaths are in children under 10. Secondary attack rates can be as high as 40% in households. In the United States, there are an estimated 500,000 cases of shigellosis every year, making it the third most common bacterial enteric disease. Approximately 100 cases are reported in Iowa annually. Outbreaks most often occur in child care centers, among men who have sex with men, and in jails. Outbreaks have also been caused by contaminated imported food. *S. sonnei* is the most common *Shigella* species reported in Iowa. Diapered children playing in "kiddie" pools or other recreational water for young children filled with tap water without addition of chlorine or bleach can also easily spread *Shigella*.

H. Bioterrorism Potential

Category B Agent: *Shigella* has been identified as a potential category B bioterrorism agent as a food safety threat.

2) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To determine whether a case may be a source of infection for others (e.g., a diapered child, child care attendee or food handler) and if so, to prevent further transmission.
- To identify transmission sources of public health concern (e.g., a restaurant or a commercially distributed food product) and to stop transmission.

B. Laboratory and Healthcare Provider Reporting Requirements

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider must report. The preferred method of reporting is by utilizing the Iowa Disease Surveillance System (IDSS). However, if IDSS is not available, the reporting number for IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736; fax number (515) 281-5698, mailing address:

IDPH, CADE
Lucas State Office Building, 5th Floor
321 E. 12th Street
Des Moines, IA 50319-0075

Postage-paid disease reporting forms are available free of charge from the IDPH clearinghouse. Call (319) 398-5133 or visit the website:

healthclearhouse.drugfreeinfo.org/cart.php?target=category&category_id=295 to request a supply.

Laboratory Testing Services Available

The State Hygienic Laboratory at the University of Iowa (SHL) provides testing of stool specimens for the presence of *Shigella* and will confirm and speciate isolates of *Shigella* obtained from clinical specimens at other laboratories. All laboratories are required to submit all isolates cultured for further identification to aid in the public health surveillance necessary for this illness and to prevent further transmission. For more information call SHL at (319)-335-4500.

SHL will test implicated food items from a cluster or outbreak. Food samples are submitted through consultation with SHL and the Centers for Acute Disease Epidemiology by the local public health department.

C. Local Public Health Agency Follow-up Responsibilities

Case Investigation

Following notification, the LPHA(s) will complete an official investigation by interviewing the case and others who may be able to provide pertinent information. Much of the investigation information required can be obtained from the healthcare provider or the medical record. Investigation information should be entered into the Iowa Disease Surveillance System (IDSS).

- a. Use the following guidelines to complete the investigation:
 - 1) Record the demographic information, date of symptom onset, symptoms, diagnostic testing, date of specimen collection, laboratory conducting the testing, species identification and serotyping. Please, request isolates to be sent to the SHL.
 - 2) When asking about exposure history (food, travel, activities, etc.), use the incubation period for shigellosis (12–96 hours). Specifically, focus on the period beginning a minimum of 12 hours prior to the case's onset back to 96 hours before onset.
 - 3) Record any restaurants at which the case ate during the incubation period, including food item(s) and date consumed. If it is suspected that the case became infected through food, further investigation may be needed.
 - 4) Ask about travel history and outdoor activities to help identify where the case may have been infected.
 - 5) Ask about the case's water supply as well as recreational water activities because *Shigella* may be acquired through water consumption.
 - 6) A case history that includes household/close contacts, antimicrobial treatment, pet or other animal contact, child care, and food-handler questions is designed to look for possible exposure and also to assess potential for transmitting and risk to others. Important information from a public health perspective would include child care attendance or employment or food handling.
 - 7) If repeated attempts to obtain case information have been unsuccessful (*e.g.*, the case or healthcare provider does not return calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please complete the investigation with as much information as possible. Please note why any data is not complete. If using IDSS, select the appropriate reason under the Event tab in the Event Exception field.
- b. After compiling the information, enter into IDSS (the preferred method for investigation) or complete the investigation form, attach lab report(s) when available and fax (515) 281-5698 or mail (in an envelope marked "Confidential") to IDPH Center for Acute Disease Epidemiology. The mailing address is:

IDPH, CADE
Lucas State Office Building, 5th Floor
321 E. 12th Street
Des Moines, IA 50319-0075
- c. Disease-control measures are an integral part of case investigation. It is the LPHA responsibility to understand, and, if necessary, institute the control guidelines listed below.

3) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements

Food handlers, healthcare providers and people in child care with shigellosis must be excluded.

Minimum Period of Isolation of Patient

For food handlers, child care employees, and healthcare providers, two negative stool cultures must be obtained after resolution of diarrhea before they may return to work/child care. For child care attendees, one negative stool culture must be obtained after resolution of diarrhea before they may return to child care.

If a case has been treated with an antimicrobial, the stool specimen shall not be submitted until at least 48 hours after completion of therapy. If two specimens are required, they must be taken at least 24 hours apart. Good hand hygiene must be practiced.

Minimum Period of Quarantine of Contacts

Food handlers, healthcare providers and child care attendees who are contacts to a case and symptomatic with diarrhea shall be considered the same as a case and they must comply with the above requirements.

Note: A food handler is any person directly preparing or handling food. This can include a patient-care or child care provider.

B. Protection of Contacts of a Case

Instructions for stringent hand-hygiene practices will be shared with all cases as well as their contacts.

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected

Child care

Since shigellosis may be easily transmitted person-to-person through the fecal-oral route and fecal contamination is common in toddlers, it is important to carefully follow up on cases of shigellosis in child care settings. General recommendations include:

- Children with *Shigella* infection who have diarrhea should be excluded until their diarrhea is gone and have one negative stool culture. If treated with antibiotics, wait at least 48 hours after completion of antibiotics before obtaining the stool specimen. If the first stool specimen is positive, allow at least an additional 24 hours before obtaining the second specimen.
- Children with *Shigella* infection who have no diarrhea but do have positive stool cultures should be excluded as above.
- Staff of child care programs who have *Shigella* in their stools should be excluded until their diarrhea is gone and they have 2 negative stool cultures. If treated with antibiotics, wait at least 48 hours after completion of antibiotics before obtaining the first stool specimen. Allow at least an additional 24 hours before obtaining the second specimen.
- Always ensure thorough cleaning of the child care and disinfection of related items (such as toys).

School

Since shigellosis may be easily transmitted person-to-person via the fecal-oral route, it is important to carefully follow up on cases of shigellosis in a school. General recommendations include:

- Students or non food-handling staff with *Shigella* infection who have diarrhea should be excluded until their diarrhea is gone.

- Students or staff with *Shigella* positive cultures who do not handle food, have no diarrhea, and are not otherwise sick may go to school if good hand hygiene is practiced.
- Students or staff who handle food and have *Shigella* infection (symptomatic or not) must not prepare food until their diarrhea is gone and they have two negative stool tests (submitted at least 48 hours after completion of antibiotic therapy, if antibiotics are given, and taken at least 24 hours apart).
- Ensure routine thorough cleaning of the environment.

Community Residential Programs

Actions taken in response to a case of shigellosis in a community residential program will depend on the type of program and the functional level of the residents.

In long-term care facilities, residents with shigellosis should be placed on Standard (including enteric) Precautions until their symptoms subside *and* they test negative for *Shigella*. Staff members who give direct patient care (*e.g.*, feed patients, provide mouth or denture care, or give medications) are considered food handlers and are subject to food handler restrictions as listed above. In addition, staff members with *Shigella* infection who are not food handlers should not work until their diarrhea is completely resolved (no diarrheal stools for 24 hours).

In residential facilities for the developmentally disabled, staff and clients with shigellosis must refrain from handling or preparing food for other residents until their symptoms have subsided and they have 2 stool tests negative for *Shigella* (submitted at least 48 hours after completion of antibiotic therapy, if antibiotics are given, and taken at least 24 hours apart). In addition, staff members with *Shigella* infection who are not food handlers should not work until diarrhea is gone, and they must practice good hand hygiene when they return to work. Routine thorough cleaning of the environment must also occur.

Reported Incidence Is Higher than Usual/Outbreak Suspected

If the number of reported cases of shigellosis in your city/town seems higher than usual, or if an outbreak is suspected, more intensive investigation is warranted. That includes looking for a common source. A common vehicle (such as water, food, or association with a child care) should be sought and appropriate preventive or control measures should be instituted. Control of person-to-person transmission requires special emphasis on personal cleanliness and sanitary disposal of feces. Consult with the epidemiologist on-call at the Center for Acute Disease Epidemiology (CADE) or the regional epidemiologist for guidance on prevention and surveillance for additional cases.

Note: Refer to [Iowa's Foodborne Illness Outbreak Investigation Manual](#).

D. Preventive Measures

Educate families with cases in households on ways to control spread.

Shigella organisms readily develop antibiotic resistance; thus, antibiotics should be used judiciously.

Environmental Measures

If a water source is implicated it must be shut down.

Implicated food must not be served. Samples of the food should be obtained before any disposal of food items. The decision about testing the food can be made in consultation with the CADE and SHL. CADE can help coordinate pick up and testing of food samples. If a commercial product is suspected, CADE will coordinate follow-up with relevant agencies such as Iowa Department of Inspections and Appeals (DIA).

Note: The role of the DIA is to provide policy and technical assistance, such as interpreting the Iowa Food Code, conducting a hazard analysis critical control point (HACCP) risk assessment, initiating enforcement actions and collecting food samples, with the environmental investigation.

The general policy of the SHL is to test only food samples implicated in suspected outbreaks, not single cases (except when botulism is suspected). The local public health agency (LPHA) may suggest that the handlers of food suspected in a single case locate a private laboratory that will test or freeze the food for a period of time in case additional reports are received.

To prevent *Shigella* and other pathogens transmitted by the fecal-oral route, it is recommended that people:

- Always wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet, and after changing diapers.
- Wash children's hands as well as their own after changing diapers.
- In child care settings, dispose of feces in a sanitary manner.
- Scrub their hands with soap and water, when caring for someone with diarrhea, after cleaning the bathroom, helping the person use the toilet, or changing diapers, soiled clothes or soiled sheets.
- Avoid sexual practices that may permit fecal-oral transmission. Latex barrier protection should be emphasized to prevent the spread of shigellosis to sexual partners and to prevent the exposure to, and transmission of, other pathogens.
- Keep flies from contaminating food.
- Routinely clean the environment thoroughly.
- Clean environment with household disinfectant or bleach and water solution (one quarter cup bleach per gallon of water, mixed fresh daily).

International Travel

The following recommendations can be helpful for travelers to developing countries.

- "Boil it, cook it, peel it, or forget it."
- Drink only bottled or boiled water, keeping in mind that bottled carbonated water is safer than uncarbonated water.
- Ask for drinks without ice unless the ice is made from bottled or boiled water. Avoid popsicles and flavored ices that may have been made with contaminated water.
- Eat foods that have been thoroughly cooked and are still hot and steaming.
- Avoid raw vegetables and fruits that cannot be peeled. Vegetables like lettuce are easily contaminated and are often inadequately washed.
- Peel your own raw fruits or vegetables and do not eat the peelings.
- Avoid foods and beverages from street vendors.

Note: For more information on international travel, contact the Center for Disease Control and Prevention (CDC), Traveler's Health Office, at (877) 394-8747 or through the Internet at www.cdc.gov/travel.

4) ADDITIONAL INFORMATION

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Shigellosis can be found at: <http://wwwn.cdc.gov/nndss/case-definitions.html>

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

References

American Academy of Pediatrics. *Red Book: 2015 Report of the Committee on Infectious Diseases, 30th Edition*. Illinois, American Academy of Pediatrics, 2015.

Centers for Disease Control. Shigella website: www.cdc.gov/shigella/index.html

Heymann, D.L., ed. *Control of Communicable Diseases Manual, 20th Edition*. Washington, DC, American Public Health Association, 2015.